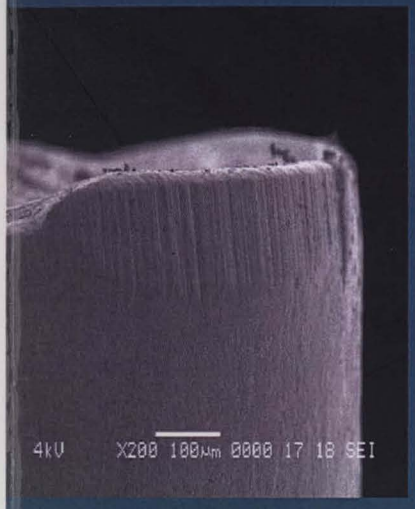


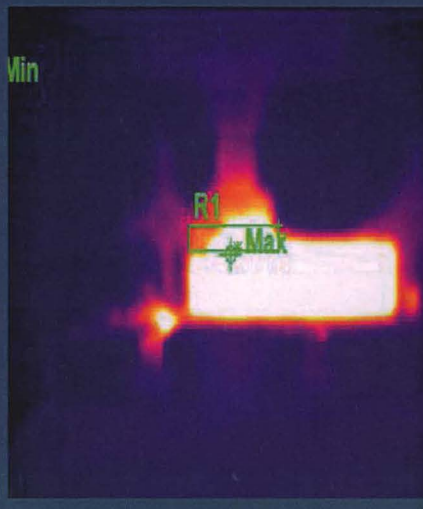


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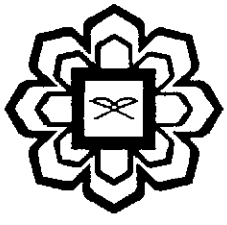

**IIUM Press**

Published by:
IIUM Press
International Islamic University Malaysia

First Edition, 2011


Perpustakaan Negara Malaysia Cataloguing-in-Publication Data

ISBN: 978-967-418-159-8

Member of Majlis Penerbitan Ilmiah Malaysia – MAPIM
(Malaysian Scholarly Publishing Council)

Printed by :
**IIUM PRINTING SDN.BHD.**
No. 1, Jalan Industri Batu Caves 1/3
Taman Perindustrian Batu Caves
Batu Caves Centre Point
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Chapter 25

# Metabolic Energy of Manual Lifting in Manufacturing Industry

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## 1. Introduction

Many ergonomics measure to define safe working condition have been determined with the principal consideration of biomechanical, physiological and psychological [1]. In physiological, metabolic energy is used as measure of energy consumed by human body while providing manual lifiting activity [2]. Metabolic energy is one of performance measure in workstation design. Workstation as \well as job activity must be designed with minimum metabolic energy consumption of the workers.

Metabolic energy could be used to predict maximum capability of the workers. It is represented by the relation between metabolic energy of the working activity and individual aerobic resistance. Metabolic energy consumption also can be considered to design alternative work method, to calculate weight and salary, to determine rest time and frequency, and to predict hot pressure in case of temperature and humidity level exceed normal standard of comfort.

## 2. Consideration factors

Several methods have been developed to predict metabolic energy of manual activity. Prediction is provided base on assumption that all of the activity can be divided into several elements. Hence, the average of metabolic energy can be predicted by using metabolic energy of activity element and working time. Metabolic energy of the activity is derived from metabolic cost calculated base on measurable factors, i. e. force, distance, body posture, technique, gender. body weight and time.

Metabolic energy consists of static and dynamic work. Therefore, variables of work and human need to be considered in order to study their effect to metabolic energy. It involves gender, body weight. load weight, frequency, range of vertical height, forward and side movement of hand in